

CLAIMS

What is claimed is:

- 1 1. A method comprising:
2 forming a resist using a highly absorbing material;
3 thinning the resist to a pre-determined thickness used as an imaging layer; and
4 improving efficiency of a photoactive acid generator (PAG) to capture secondary
5 electrons produced by an ionizing radiation in the resist.
- 1 2. The method of claim 1 wherein forming the resist comprises:
2 forming the resist using a highly absorbing material selected from fluorine (F), tin
3 (Sn), bismuth (Bi), cesium (Cs), and antimony (Sb).
- 1 3. The method of claim 2 wherein forming the resist comprises:
2 adding at least one of the fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), and
3 antimony (Sb) into a baseline material.
- 1 4. The method of claim 2 wherein forming the resist comprises:
2 forming the resist using one of a fluoropolymer, a metallocene polymer, an
3 alkoxide chelate polymer, and a carboxylate chelate polymer.
- 1 5. The method of claim 1 wherein thinning comprises:
2 thinning the resist to a thickness below 100 nm.
- 1 6. The method of claim 1 wherein improving comprises:
2 increasing a PAG concentration in the resist.
- 1 7. The method of claim 1 wherein improving comprises:
2 controlling moieties proximal to a cleavable bond in the PAG.
- 1 8. The method of claim 1 further comprising:

2 exposing the resist with a radiation being one of an extreme ultraviolet (EUV), X-
3 ray, electron beam, and ion beam.

1 9. A method comprising:

2 forming an imaging layer from a resist made of a highly absorbing material, the
3 layer being thinned to a pre-determined thickness, the layer having improved efficiency of
4 a photoactive acid generator (PAG) to capture secondary electrons produced by an ionizing
5 radiation; and

6 forming an etch resistant layer below the imaging layer for pattern transfer from the
7 imaging layer.

1 10. The method of claim 9 wherein the highly absorbing material is selected
2 from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), and antimony (Sb).

1 11. The method of claim 10 wherein forming the imaging layer comprises:
2 adding to a baseline material by at least one of the fluorine (F), tin (Sn), bismuth
3 (Bi), cesium (Cs), and antimony (Sb).

1 12. The method of claim 10 wherein the imaging layer is made by one of a
2 fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate
3 chelate polymer.

1 13. The method of claim 9 wherein the thickness is below 100 nm.

1 14. The method of claim 9 wherein the imaging layer has an increased PAG
2 concentration.

1 15. The method of claim 9 wherein the imaging layer has controlled moieties
2 proximal to a cleavable bond in the PAG.

1 16. The method of claim 11 further comprising:
2 exposing the imaging layer to a radiation being one of an extreme ultraviolet
3 (EUV), X-ray, electron beam, and ion beam.

1 17. A device comprising:
 2 an imaging layer made of a highly absorbing material, the layer being thinned to a
 3 pre-determined thickness, the layer having improved efficiency of a photoactive acid
 4 generator (PAG) to capture secondary electrons produced by an ionizing radiation; and
 5 an etch resistant layer below the imaging layer for pattern transfer from the imaging
 6 layer.

1 18. The device of claim 11 wherein the highly absorbing material is selected
 2 from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), and antimony (Sb).

1 19. The device of claim 12 wherein the imaging layer comprises:
 2 a baseline material added by at least one of the fluorine (F), tin (Sn), bismuth (Bi),
 3 cesium (Cs), and antimony (Sb).

1 20. The device of claim 12 wherein the imaging layer is made by one of a
 2 fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate
 3 chelate polymer.

1 21. The device of claim 11 wherein the thickness is below 100 nm.

1 22. The device of claim 11 wherein the imaging layer has an increased PAG
 2 concentration.

1 23. The device of claim 11 wherein the imaging layer has controlled moieties
 2 proximal to a cleavable bond in the PAG.

1 24. The device of claim 18 wherein the imaging layer is exposed with the
 2 radiation being one of an extreme ultraviolet (EUV), X-ray, electron beam, and ion beam.